PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-036964

(43)Date of publication of application : 09.02.2001

(51)Int.Cl. H04Q 7/38

H04B 7/26

H04J 13/00

H04L 1/00

(21)Application number : 11-205772

(22)Date of filing : 21.07.1999

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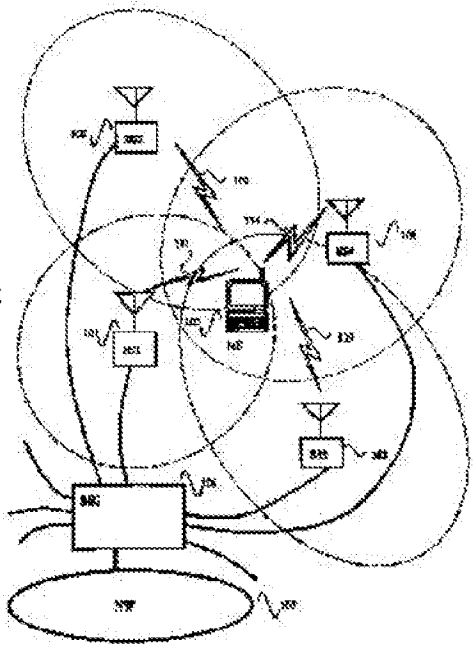
(54) COMMUNICATION SYSTEM AND ITS METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To attain high speed transmission and the valid use of a radio resource in a radio communication system.
SOLUTION: In this communication system constituted of a radio terminal 105 and plural radio base stations 101-104 for communicating through a communication line with the radio terminal, a communication line to be used for communication is selected based on the communication line qualities 111-114, and communication information is divided for each selected communication line, and the divided communication information is communicated through the selected communication line so that high speed transmission can be realized.



CLAIMS

[Claim(s)]

[Claim 1]In a communications system which consists of two or more base transceiver stations which communicate via a radio terminal, said radio terminal, and a communication line, A communications system which selects two or more communication lines which should be used for communication, and is characterized by

a thing from which it was selected, and which communication information is divided for said two or more communication lines of every, and is communicated via said selected communication line in said divided communication information based on line quality of said communication line.

[Claim 2]The communications system according to claim 1 dividing after error-correcting-code-izing said communication information and interleave-izing it further, when dividing communication information for said two or more of said selected communication lines of every.

[Claim 3]In a correspondence procedure of a communications system characterized by comprising the following. Each communication quality of two or more transmission lines between said radio terminal and said two or more base stations is computed, Based on said each computed communication quality, access speed which said radio terminal can transmit is computed for said every base station, Based on said each computed access speed, information is distributed for every aforementioned base station, Said distributed information is transmitted with access speed defined for every aforementioned base station to said base station corresponding to each, In each aforementioned base station, receive said distributed information, and each aforementioned base station transmits said received information to said base station control station, A correspondence procedure, wherein said base station control station receives information which each aforementioned base station transmitted and re-compounds information from said each received base station in said base station control station.

A radio terminal.

Two or more base stations which communicate with said radio terminal.

A base station control station which controls said base station.

[Claim 4]In a correspondence procedure of a communications system characterized by comprising the following. Each communication quality of two or more transmission lines between said radio terminal and said two or more base stations is computed, Based on said each computed communication quality, said each base station computes access speed which can transmit to said radio terminal, and it said base station control station, Based on said each computed access speed, distribute information which should be transmitted to said radio terminal for every aforementioned base station, and each aforementioned base station, A correspondence procedure, wherein it transmits said distributed information with access speed which was able to be defined for every aforementioned base station,

said radio terminal receives information which each aforementioned base station transmitted and said radio terminal re-compounds information from said each received base station.
A radio terminal.
Two or more base stations which communicate with said radio terminal.
A base station control station which controls said base station.

[Claim 5]A communications system according to claim 3 to 4 distributing after error-correcting-code-izing said information and interleave-izing it further, before distributing said information.
[Claim 6]A base station control station which controls two or more base stations which communicate with a radio terminal, comprising:
Memory storage which memorizes communication quality of a transmission line of said radio terminal and each aforementioned base station.
An access speed calculation device which computes access speed which should be adapted for every base station based on communication quality for every transmission line memorized by said memory storage.
A dividing device which divides communication information for every base station based on access speed for every base station computed by said access speed calculation device.
A sending set which transmits communication information divided by said dividing device to said each base station.

[Claim 7]The base station control station according to claim 6, wherein said radio terminal collects said communication quality for every channel.
[Claim 8]A radio terminal which communicates with two or more base stations, comprising:
A receiving set which receives a signal from said two or more base stations.
A communication quality calculation device which computes each communication quality of two or more signals received with said receiving set.
A speed calculation device which computes access speed which can transmit for said every base station based on each communication quality computed by said communication quality calculation device and which can be transmitted.
A dividing device which divides information which should be transmitted for every aforementioned base station based on each access speed computed by said speed calculation device which can be transmitted.

A sending set which transmits information divided by said dividing device to each aforementioned base station.

[Claim 9]A radio terminal which communicates with two or more base stations, comprising:
A receiving set which receives a signal from said base station.
A signal which computes signal versus interference-wave-power ratio of signal received with said receiving set versus interference-wave-power ratio calculation device.
An access speed calculation device which computes access speed to said base station based on said signal versus interference-wave-power ratio.
A table preparation device which creates a table to which make access speed computed by said access speed calculation device come to correspond for said every base station.
Memory storage which memorizes a table created by said table preparation device.
A dividing device which divides communication information for said two or more base stations of every based on a table memorized by said memory storage.
A sending set which transmits communication information divided by said dividing device to each base station.

[Claim 10]A radio terminal which communicates with two or more base stations, comprising:
A receiving set which receives an information-sharing order signal transmitted from any one of said base stations.
A dividing device which divides information which should be transmitted for every aforementioned base station based on an information-sharing order signal received by said receiving set.
A sending set which transmits information divided by said dividing device with access speed which was able to be defined for every aforementioned base station.

[Claim 11]They are included in said information-sharing order signal by access speed for every base station, and rate of division, and said dividing device, Based on a rate of said information-sharing order signal ********** aforementioned division, divide information for every base station, and said sending set, The radio terminal according to claim 10 transmitting information divided by said dividing device based on said access speed contained in said information-sharing order signal for every

aforementioned base station.

[Claim 12]A base station control station which controls two or more base stations which communicate with a radio terminal, comprising:

An access speed calculation device which computes receiving access speed which should be adapted for this every base station based on receiving quality for said every base station.

A sending set which transmits at least receiving access speed for said every base station which said access speed calculation device computed to said radio terminal via one base station.

A receiving set which receives communication information which said radio terminal divided and transmitted for said every base station based on said receiving access speed which said sending set transmitted via this each base station.

A multiplexing device which was received with said receiving set and which multiplexes division **** communication information for every base station.

[Claim 13]A base station controller which controls two or more base stations which communicate with a radio terminal, comprising:

An access speed calculation device which computes access speed which can transmit by said upstream based on a signal versus interference-wave-power ratio of an upstream of each base station which said each base station computed.

it is said access speed calculation device -- a table preparation device which creates a table to which said computed access speed is made to correspond for said every base station.

Memory storage which memorizes a table created by said table preparation device.

A multiplexing device which multiplexes two or more communication information which said radio terminal divided into said two or more base stations so much, and transmitted to them based on a table memorized by said memory storage, and is restored to information before division.

[Claim 14]A radio terminal which communicates with two or more base stations controlled by base station control station, comprising:

A communication quality calculation device which said two or more base stations get down, and transmits via a circuit and which gets down and computes communication quality of a signal.

Said speed calculation device which said communication quality calculation device computed, which gets down and computes access speed which can transmit by each

going-down circuit of each of said base station based on each communication quality for every signal and which can be transmitted.
A sending set which transmits at least access speed of each of said base station which said speed calculation device which can be transmitted computed to said base station control station via one base station.
A multiplexing device which multiplexes communication information which said base station control station divides and transmits for said two or more base stations of every based on said access speed based on this access speed, and is restored to information before division.

[Claim 15]A radio terminal which communicates with two or more base stations controlled by base station control station, comprising:
A communication quality calculation device which said two or more base stations get down, and transmits via a circuit and which gets down and computes communication quality of a signal.
A sending set which transmits said communication quality to said base station control station via said one of base stations.
A receiving set which receives communication information which said base station control station got down based on said communication quality, access speed for every circuit was computed, and said plurality got down based on said computed access speed, was divided for every circuit, and was transmitted.
A multiplexing device which multiplexes said communication information which said receiving set received based on said access speed.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to a wireless communication method and radio communication equipment, and relates to the wireless communication method set up and employed between a terminal, a base station, and a base station controller in radio communications systems, such as a cellular communication system, especially.
[0002]
[Description of the Prior Art]Although communicating with one base station is most, in the case of hand-over, a terminal connects the conventional terminal with two or

more base stations exceptionally. For example, as an example of conventional technology, there are USP5, 101 and 501, USP5, 267 and 261, USP5, 088 and 108, USP5, 109 and 528, USP5, 327 and 577, and an invention indicated in the Patent Publication Heisei No. 511835 [ten to] gazette.

[0003]The service area of the base station is made to overlap a radio communications system between adjacent base stations generally that the continuity of communications service should be guaranteed. A handover is performed in this overlapped field. Although a terminal performs two or more base stations and line connections in the case of a handover, as for any circuit, the data of an identical content is transmitted and received.

[0004]

[Problem(s) to be Solved by the Invention]Which cellular radio terminal may be in the radio wave state which can communicate with other base stations with a certain fixed access speed the base station of 1, and during communication. Such radio wave environment mainly has few other users, and when an empty circuit exists, it is generated mostly, since the number of users simultaneously connectable with a base station by an interference power ratio with other terminals is determined in CDMA (code division multiple access standard), if other terminals are in few situations --- since interference power is small --- other base stations --- simultaneous --- **** --- it becomes the radio wave environment [-izing / radio wave environment]. However, in the conventional system, since the terminal is connected only with one base station even if it suits such radio wave environment, the technical problem that access speed will be restricted to the maximum of one circuit occurs, while --- although a terminal has two or more base transceiver stations, simultaneously a case where it connects, for a handover ---- the character top of a handover ---- this ---- each connectable circuit can send only the same information simultaneously. Therefore, since it is the structure which can transmit and receive only the same information as the circuit under present connection to other wireless circuits even if it suits the radio wave state in which connection with other base stations is possible using other wireless circuits, the result which cannot use radio resources effectively is caused. After all, in transmission, the technical problem that access speed will be restricted at the maximum per circuit occurs.

[0005]When it is in radio wave environment connectable also with the base station of 1, and the base transceiver station of others [terminal / under connection] in view of an aforementioned problem, the purpose of this invention is to connect with other base transceiver stations simultaneously, and aims at raising access speed by

distributing and sending the information which should be transmitted and received by the terminal and net side.

[0006]When communicating simultaneously with two or more base transceiver stations, line speed is determined according to the radio wave environment, and it aims at providing the more stable communications service to effective use of radio resources in each base transceiver station.

[0007]It aims at providing the dynamic communications service according to radio wave environment by making access speed change according to it, or occasionally cutting a circuit, when radio wave environment gets worse two or more base transceiver stations and during communication.

[0008]By what a DEINTA reeve is carried out and is done for error correction decoding after error-correcting-code-izing the information to transmit, carrying out interleave and multiplexing the circuit which is distributed and transmitted to a circuit with two or more base stations, and is written in a receiver. It aims at multiplexing and suppressing degradation of the signal after an error correction low, even if the communication quality of some circuits deteriorates.

[0009]It aims at providing radio service of a best effort type by assigning a high-speed circuit in this invention, if radio wave environment avoids, but making the access speed into a low speed, if radio wave environment gets worse.

[0010]

[Means for Solving the Problem]A radio terminal of the invention in this application is provided with the following.

A receiving set which receives a signal from two or more base stations that an above-mentioned technical problem should be solved.

A communication quality calculation device which computes each communication quality of two or more signals received with said receiving set.

A speed calculation device which computes access speed which can transmit for said every base station based on each communication quality computed by said communication quality calculation device and which can be transmitted.

A dividing device which divides information which should be transmitted for every aforementioned base station based on each access speed computed by said speed calculation device which can be transmitted, and a sending set which transmits information divided by said dividing device to each aforementioned base station.

[0011]In the invention in this application, a signal versus interference-wave-power ratio (for example, Eb/N0, Ec/I0, or these should put together) is used as

communication quality.

[0012]A radio terminal of the invention in this application is provided with the following.

A receiving set which receives a signal from said base station.

An Eb/N0 calculation device which computes signal versus interference-wave-power ratio Eb/N0 of a signal received with said receiving set.

Signal which computes ** received with said receiving set versus interference-wave-power ratio calculation device.

based on said signal versus interference-wave-power ratio with an access speed calculation device which computes access speed (or --- from said base station) to said base station. A table preparation device which creates a table to which make access speed computed by said access speed calculation device come to correspond for said every base station, Memory storage which memorizes a table created by said table preparation device, a dividing device which divides communication information for said two or more base stations of every based on a table memorized by said memory storage, and a sending set which transmits communication information divided by said dividing device to each base station.

[0013]A base station control station of the invention in this application is provided with the following.

Memory storage which memorizes communication quality of a transmission line of said radio terminal and each aforementioned base station.

An access speed calculation device which computes access speed which should be adapted for every base station based on communication quality for every base station memorized by said memory storage.

A dividing device which divides communication information for every base station based on access speed for every base station computed by said access speed calculation device.

A sending set which transmits communication information divided by said dividing device to said each base station.

a radio terminal or a base transceiver station collected communication quality for every channel --- it comes out.

[0014]A radio terminal of the invention in this application is provided with the following.

A receiving set which receives an information-sharing order signal transmitted from any one of base stations.

A dividing device which divides information which should be transmitted for every aforementioned base station based on an information-sharing order signal received by

said receiving set.

A sending set which transmits information divided by said dividing device with access speed which was able to be defined for every aforementioned base station.

They are included in an information-sharing order signal by access speed for every base station, and rate of division, and said dividing device. Based on a rate of said information-sharing order signal ********** aforementioned division, information is divided for every base station, and said sending set transmits information divided by said dividing device based on said access speed contained in said information-sharing order signal for every aforementioned base station.

[0015]An access speed control signal may be used instead of an information-sharing order signal, and it may constitute so that information may be divided for every base station based on access speed contained in this access speed control signal.

[0016]Two or more base stations where a correspondence procedure of the invention in this application communicates with a radio terminal and said radio terminal, It is a correspondence procedure of a communications system containing a base station control station which controls said base station, Each communication quality of two or more transmission lines between said radio terminal and said two or more base stations is computed, Based on said each computed communication quality, access speed which said radio terminal can transmit is computed for said every base station, Based on said each computed access speed, information is distributed for every aforementioned base station, Said distributed information is transmitted with access speed defined for every aforementioned base station to said base station corresponding to each, Said distributed information is received in each aforementioned base station, each aforementioned base station transmits said received information to said base station control station, and said base station control station receives information which each aforementioned base station transmitted, and re-compounds information from said each received base station in said base station control station.

[0017]A correspondence procedure of the invention in this application computes each communication quality of two or more transmission lines between a radio terminal and two or more base stations, Based on said each computed communication quality, said each base station computes access speed which can transmit to said radio terminal, and it said base station control station, Based on said each computed access speed, distribute information which should be transmitted to said radio terminal for every aforementioned base station, and each aforementioned base station, Said distributed information is transmitted with access speed which was able to be defined for every

aforementioned base station, said radio terminal receives information which each aforementioned base station transmitted, and said radio terminal re-compounds information from said each received base station.

[0018]Although a radio terminal or a base station computes communication quality of a transmission line, when a radio terminal computes, it may report communication quality to a base station control station via a base station. A base station control station computes access speed based on such communication quality. It may compute in a radio terminal or a base station.

[0019]A communications system of the invention in this application consists of two or more base transceiver stations which communicate via a radio terminal, said radio terminal, and a communication line, Based on line quality of a communication line, high-speed transmission is made possible by communicating via a communication line which a communication line which should be used for communication was selected [communication line] and had selected communication information which divided communication information and was divided for every communication line selected.

[0020]A communications system of the invention in this application makes possible ** which makes signal deterioration after multiplexing the minimum, even if a part of communication line quality deteriorates, in order to perform an error correcting code and interleave at the transmitting side before division of communication information and to perform DEINTA reeve decoding after multiplex by a receiver.

[0021]A base station control station of the invention in this application is provided with the following.

An access speed calculation device which computes receiving access speed which should be adapted for this every base station based on receiving quality for every base station.

A sending set which transmits at least receiving access speed for said every base station which said access speed calculation device computed to said radio terminal via one base station.

A receiving set which receives communication information which said radio terminal divided and transmitted for said every base station based on said receiving access speed which said sending set transmitted via this each base station.

A multiplexing device which was received with said receiving set and which multiplexes division **** communication information for every base station.

[0022]A base station control station of the invention in this application is provided with the following.

An access speed calculation device which computes access speed which can transmit by said upstream based on a signal versus interference-wave-power ratio of an upstream of each base station which said each base station computed.
it is said access speed calculation device -- a table preparation device which creates a table to which said computed access speed is made to correspond for said every base station.
Memory storage which memorizes a table created by said table preparation device.
A multiplexing device which multiplexes two or more communication information which said radio terminal divided into said two or more base stations so much, and transmitted to them based on a table memorized by said memory storage, and is restored to information before division.

[0023]A radio terminal of the invention in this application is provided with the following.
A communication quality calculation device which said two or more base stations get down, and transmits via a circuit and which gets down and computes communication quality of a signal.
Said speed calculation device which said communication quality calculation device computed, which gets down and computes access speed which can transmit by each going-down circuit of each of said base station based on each communication quality for every signal and which can be transmitted.
A sending set which transmits at least access speed of each of said base station which said speed calculation device which can be transmitted computed to said base station control station via one base station.
A multiplexing device which multiplexes communication information which said base station control station divides and transmits for said two or more base stations of every based on said access speed based on this access speed, and is restored to information before division.

[0024]A radio terminal of the invention in this application is provided with the following.
A communication quality calculation device which two or more base stations get down, and transmits via a circuit and which gets down and computes communication quality of a signal.
A sending set which transmits said communication quality to said base station control station via said one of base stations.
A receiving set which receives communication information which said base station control station got down based on said communication quality, access speed for every

circuit was computed, and said plurality got down based on said computed access speed, was divided for every circuit, and was transmitted.
A multiplexing device which multiplexes said communication information which said receiving set received based on said access speed.

[0025]In the invention in this application, the following correspondence procedures are adopted that an above-mentioned technical problem should be solved.
[0026](1) In terminal dispatch, in an access channel and base station dispatch, set one wireless circuit to a terminal among one base station with a paging channel. This is the same as a wireless circuit setting method which the former depends cellular.
[0027](2) Assume a case where there is a high-speed transmission demand further and a terminal has the transmission or receiving ability using another channel rather than access speed specified in either a terminal, a base station and a base station controller. A circuit which set up 1 or control signal electric power of two or more base stations including a base station under received connection by the above-mentioned (1) reports a terminal to a base station and a base station controller. For example, in the case of CDMA, pilot signal electric power is reported.
[0028](3) A base station controller chooses access speed in which radio resources for every base station and transmission and reception of a terminal are possible to a connection candidate's base station from a report result of (2). It judges whether furthermore a circuit is newly connectable with each candidate base station, and access speed assigned from an interference noise electric power report for every candidate base station of a radio terminal is determined.
[0029](4) A base station controller reports to a terminal access speed which can be assigned to a connectable list of other base stations, and each base station using a circuit set up by (1).
[0030](5) A terminal sets up a circuit with new 1 or two or more base stations according to directions of (4). This procedure is the same as the time of hand-over, if it removes that the number of base stations which it is newly going to connect may exceed 2.
[0031](6) A base station controller notifies it to a terminal while checking completion of cross connection in (5). It gets down, and in a circuit (it transmits to a terminal from a base station), a sending signal is compared to access speed and it distributes for every circuit, and for every base station, a base station controller regards it as an independent signal series, becomes irregular, and transmits to a terminal. After a terminal restores to a signal received from 1 or two or more base stations

independently respectively for every circuit, it multiplexes them in order of a signal series, and reproduces a transmitted signal.

[0032](7) In the case of an upstream (it transmits to a base station from a terminal), a base station controller chooses a connection candidate base station from a result of (2). It judges whether a circuit is newly connectable with each candidate base station, and it gets down, access speed of an upstream is presumed and determined from a receiving level of a circuit, and it reports to a radio terminal. At this time, a base station controller may report only a base station linked to a radio terminal, and a radio terminal may determine access speed. If a line connection procedure is completed between a radio terminal and a base station controller, a sending signal is compared to access speed which can be transmitted between base stations, and it distributes for every circuit, and to 1 or two or more base stations, a terminal will become irregular independently respectively and will transmit. After a base station controller restores to a signal received from 1 or two or more base stations for every circuit independently respectively, it multiplexes them in order of a signal series, and reproduces a transmitted signal.

[0033](8) In order to strengthen error proof stress, before distributing a signal for every circuit, error-correcting-code-izing and interleave may be performed in the transmitting side of a base station controller and a terminal. In that case, in a receiver of a base station controller, the rearrangement of the signal to which it restored in each base station is carried out with a base station controller, a DEINTA reeve is carried out to the transmitting side in the order of a foul trick, and error correction decoding is performed. It is the same, and a receiver of a terminal also carries out the rearrangement of the signal to which it restored in each receive port, and a DEINTA reeve is carried out to the transmitting side in the order of a foul trick, and it performs error correction decoding. When quality of a certain circuit deteriorates rapidly among two or more circuits by this, degradation of line quality can be minimized.

[0034](9) After setting up two or more circuits between a terminal, a base station, and a base station controller, transmission and reception of control information between a terminal and a base station controller may use any circuit.

[0035](10) According to movement of a terminal, a terminal and a radio wave state between base stations change. Therefore, it is necessary to make a certain circuit into **, and it newly needs to set up a circuit. Communication is maintained by performing setting out and release of a circuit if needed for radio wave environment and a user.

[0036]Access speed of a signal (upstream) which a radio terminal transmits, Based on

communication quality which a base station control station received in each last base station, it judges whether it is usable in radio resources, and decides with reference to an access speed table, and a base station control station notifies determined transmission speed information to a radio terminal via one base station at least.

[0037]Based on communication quality with each base station received with a radio terminal just before transmitting, a radio terminal determines access speed of a signal (getting down circuit) which a base station (base station control station) transmits with reference to an access speed table. Information on access speed which each base station can transmit is notified to a base station control station via one base station at least from a radio terminal. However, since not all radio resources are manageable in a radio terminal, a radio terminal may notify communication quality with each base station to a base station control station, and access speed may be determined after judging use propriety of radio resources by a base station control station.

[0038]

[Embodiment of the Invention]The maximum transmission speed of a digital communication system is determined according to the modulation method of the system by the ratio of digital signal electric power to interference noise electric power. When the ratio of the electric power per bit to the interference noise power flux density per zone defines this, it is expressed with Eb/No in many cases. It is also possible to apply by the total received power spectrum density (Io) within the integral value (Ec) covering PN tip period of pilot electric power and a zone, and it is expressed in the system using periodic PN codes, such as CDMA, as numerals of a pilot signal by Ec/Io in this case in many cases. Eb/No and the measure which expresses other line quality instead of Ec/Io may be used. In this paper, it explains focusing on the example applied to CDMA, and description of these is used below.

[0039](Example 1) The composition of the cellular system which applies this invention is shown in drawing 1. The terminal (Mobile Station: following MS) 105 is connected with the base stations 101-104 (Base Station: following BS) through a wireless circuit. Each BS connects with the base station controller 106 (Base Station Controller: following BSC) by a communication line. BSC connects with the net 107 of a higher rank. Each circuits 111-114 are circuits which became independent, respectively, and it is characteristic that the information to which line speed is also transmitted also differs at this invention. That is, by distributing, transmitting and receiving the information usually transmitted and received via one BS to two or more BS, high-speed transmission is made possible as a whole.

[0040]The drawing which made drawing 1 more detailed is indicated in drawing 2. In drawing 2, since Ec/I0 of the circuit 111 is the highest, access speed is assigned most highly. Hereafter, as for the circuits 112-114, access speed is assigned according to Ec/IO. Communication of the radio terminal 105 with the access speed of K+L+M+N is attained at the maximum under the interference control condition between circuits.

[0041]The composition of BSC of this invention is explained using drawing 2. A forward link, The data from the network 107. It consists of the buffer / the separation part 207 which performs control for separating the coding + interleaving part 208 which codes and carries out interleave, and its output according to the access speed set up for every BS, and the data distribution apparatus 206 which performs an interface function and data communications with each BS. A reverse link buffers the data concentrator 201 which collects the traffic and the control data from each BS, and its output, and consists of the DEINTA reeve + decoding part 203 which decrypts by carrying out the DEINTA reeve of the buffer / multiplexing part which carries out multiplex restoration, and its output to the data of a basis. Each formation part of the above-mentioned forward link and a reverse link manages the usable radio resources of each BS of the access speed control section 204 which assigns access speed, and a BSC subordinate, and includes the radio-resources Management Department 205 which distributes.

[0042]On the other hand, MS obtains the circuit of BS with best Eb/No, when Ec/Io of a pilot signal connects with best BS. However, if it exceeds the lower limit from which Eb/No required to maintain the access speed and line quality of the pilot signal which other BS transmits which need Ec/Io for system management is obtained, the circuit can also communicate by choosing access speed appropriately and making it correspond. Here, Eb/No of the signal which received from BS101-104 was set to k, l, m, and n (k>l>m>n) at order, and corresponding access speed (bit per second: following bps) was set to K, L, M, and N (K>L>M>N). The radio-resources Management Department 205 manages the line quality k, l, and m of the circuit 111-114 detected by MS105 or BS101-104, and n. The access speed control section 204 reads the line quality of each circuit stored in the radio-resources Management Department 205, and computes the possible access speed for every circuit based on this line quality. The access speed control section 204 stores the access speed for every computed circuit as a table. Although only four BS is indicated to drawing 1 and 2, it may be 4 or more and 4 or less.

[0043]Next, the going-down circuit which BS transmits is explained to an example. The information from NW107 will serve as the frame structure 302 to which the tail bit

(Tail) was added, if frame identifiers (ID), a frame attribute (Type), and continuing error correcting code-ization assume that it is convolutional code-ization for every specified information [which is shown by 301 of drawing 3] length. It is coded in the coding part (FEC+Interleave) 208, and this frame 302 serves as the coded sequence (FEC+Interleaved Sequence) 303. The encoding parameter at this time is specified by the access speed control section 204 and the radio-resources Management Department 205. A buffer / separation part 207 once stores the coded information series. Based on the table of the access speed control section 204, subframe division of the data distribution part 206 is carried out for every BS in the information series stored in the buffer 207 by the suitable information length to which it is shown by 304 of drawing 3. For example, subframe length is determined as the circuit 111 of BS101 at a rate of K/(K+L+M+N), and is determined as the circuit 112 of BS102 at a rate of L/(K+L+M+N). The frame identifiers (ID) and the frame attribute (Type) which made the rule in the case of BS and demultiplexing which are transmitted are added, and a subframe serves as the frame structure 305 of drawing 3. A subframe is transmitted to BS101-104 by the distribution part (Data Distribution) 206. At this time, line quality information, control information, etc. on a reverse link may be added to the frame 302 and the subframe 305. The data distribution part 206 transmits a subframe to each BS. Each BS which received the subframe is put on a radio frequency, and transmits a subframe to MS105.

[0044]The access speed control section 204 may manage directly line quality information, including Ec/Io of each forward link collected by MS105 by a reverse link, Eb/No, a frame error rate (henceforth, FER), etc., instead of the radio-resources Management Department 205. In that case, the access speed control section 204 determines the forward link access speed for every circuit based on the line quality stored in the table, and stores the access speed for every circuit in a table similarly while it stores the quality of each circuit in a table. The radio-resources Management Department 205 manages the radio resources for every BS, and controls not to exceed the transmission capacity beforehand decided for every BS.

[0045]MS105 carries out the reception recovery of the subframe which each BS101-104 transmits. According to the identifier and attribute of the subframe 305, it reassembles on the frame 303, and a DEINTA reeve and error correcting code-ization are performed, the frame 302 is detected, the information series 301 is reproduced, and the original information is restored.

[0046]A reverse link completely serves as a reverse procedure. In MS105, error-correcting-code-izing and interleave are performed for the information series

which transmits, and it distributes to each radio port which has a modulation circuit and a high frequency circuit. This radio port is equivalent to the wireless interface function of BS of a forward link. In data distribution of a reverse link, MS opts for distribution based on Eb/No for every BS. On the other hand, when newly setting up a circuit, the pilot signal from BS which is going to set up a circuit can be monitored, and access speed can be decided by the Ec/Io.

[0047]The data concentrator 201 collects the information on the received reverse link as a format of the subframe 305. Furthermore, the data concentrator 201 extracts control information required for line quality managements, such as the forward link FER. A buffer / multiplex section 202 once stores the subframe 305 in a memory, and assembles it to the coded sequence 304 according to the identifier and attribute of the subframe 305. the decoding part 303 --- the sequence 304 --- a DEINTA reeve --- and decoding processing is carried out. The check of the quality is eventually performed per frame, and the decoded data is transmitted to NW107. By the way, the access speed of each circuit is not always constant. The access speed control section 204 recalculates access speed again according to change of the line quality reported at any time.

[0048](Example 2)

1. Explain the composition of BSC more detailed than the composition of a system using drawing 4. BSC, The uphill FER detector circuit + buffer circuit 401, the multiplexing circuit 402, the DEINTA reeve circuit 403, the decoder circuit 404, the frame disassembling circuit 405, the output data interface 406, the downstream-transmission-speed control circuit 407, the access speed table 408, It comprises a network anduphill all monitor circuit [channel FER] 409, BS-IF circuit 410, buffer + all transmission speed control circuit 411, interleaver 412, coding circuit 413, frame synthetic circuit 414, and IF415, interleave, the coding parameter table 417, etc.

[0049]The lineblock diagram of BS is shown in drawing 5. Two or more receive sections 533-1 - 533-n, two or more transmission sections 534-1 - 534-n are contained in BS that it should communicate with two or more terminals. The receive section of BS comprises the received high frequency circuit 501, the complex back diffusion circuit 502, the rectangular back diffusion circuit 503, DEINTARIBA 504, the decoder circuit 505, the going-down power controller 507, the Eb/NO monitor circuit 508, the channel FER detector circuit 509, etc. On the other hand, a transmission section comprises the transmitted high frequency circuit 510, the complex diffusion circuit 511, the gain control circuit 512, the rectangular diffusion circuit 513, the uphill

power-controls bit-interleaved-multiplexing circuit 514, the interleave circuit 515, the coding circuit 516, the frame generating circuit 517, etc.

[0050]The terminal configuration of this invention is shown in drawing 6. Two or more receive sections 633-1 - 633-n, two or more transmission sections 634-1 - 634-n are contained in MS105 that it should communicate with two or more BS. The receive section of MS comprises the received high frequency circuit 601, the complex back diffusion circuit 602, the rectangular back diffusion circuit 603, DEINTARIBA 604, the decoder circuit 605, the going-down Ec/I0 detector circuit 606, the going-up power controller 607, the Eb/NO monitor circuit 608, the FER detector circuit 609, etc. On the other hand, a transmission section comprises the transmitted high frequency circuit 610, the complex diffusion circuit 611, the gain control circuit 612, the rectangular diffusion circuit 613, the power-controls bit-interleaved-multiplexing circuit 614, the interleave circuit 615, the coding circuit 616, the frame generating circuit 617, etc.

[0051]A control section common to two or more transmission and reception sections is shown in drawing 7. The common control section 735, Buffer circuit 718, multiplexing circuit 719, DEINTA reeve circuit 720, decoder-circuit 721, frame disassembling circuit 722, and data output IF723, the going-up transmission speed control circuit 724, the going-down link FER monitor circuit 725, the access speed table 740, the distribution circuit 726, a buffer. And it comprises all the transmission speed control circuit 727, interleaver 728, decoding circuit 729, frame generating circuit 730, and input data IF731, the radio-resources Management Department 732, interleave, a coding parameter table 742, etc.

[0052]2. Explain a system action, next operation of a forward link. The frame generating circuit 414 of BSC carries out part division of the input data from a network per frame, and adds a signal still more nearly required for information discernment at a receiver (630A). The coding circuit 413 error-correcting-code-izes the output of the frame generating circuit 414. The interleaver circuit 412 is interleave-ized by changing the permutation of information (628A). The radio-resources Management Department 416 gives the encoding parameter and interleave parameter at this time. Then, a buffer / full speed control circuit 411 determines the total access speed of the information transmitted from two or more BS. The forward link transmission speed control circuit 407 computes the access speed for every circuit as well as the frame error rate (henceforth, FER) of all the forward links transmitted by a reverse link based on Eb/No, the Ec/Io value, or FER of each forward link. Control of this access speed is performed in consideration of the

operating condition of the radio resources of all the BS which a BSC subordinate has. Then, a signal distributes BS-IF circuit 410 to each BS correspondence (626A). BS-IF circuit 410 becomes irregular respectively and carries out wireless transfer of the signal (626A) separated for every BS.

[0053]BS equips forward links with two or more transmission sections 534-1 - 534-n (n is two or more natural numbers). The frame generating circuit 517 performs frame-ization so that the wireless interface between BS and MS may be suited (617A). The coding circuit 516 error-correcting-code-izes the output of a frame generating circuit. The interleave circuit 515 changes that of permutation data for interleave-izing (615A). The reverse link power-controls bit-interleaved-multiplexing circuit 514 adds power-controls information to the output of the interleave circuit 515. The rectangular diffusion circuit 513 carries out quadrature modulation of the output of an interleave circuit. The gain control circuit 512 adjusts a transmission power profit. The complex diffusion circuit 511 performs complex diffusion to the information to which the transmission power profit was adjusted. The high frequency circuit 510 changes the information after complex diffusion into a transmit frequency signal, and transmits it to MS.

[0054]Next, the forward link receiving component and function of MS are explained using drawing 6 and 7. Two or more receivers 633-1 - 633-n (n is two or more natural numbers) are carried in MS105 so that two or more circuits can be received simultaneously. Each receiver operates independently respectively. As for the signal received in the received high frequency circuit 601, collation of a cell is performed in the complex back diffusion circuit 602. Then, a channel is identified in the rectangular back diffusion circuit 603, and an error correction is performed by the DEINTA reeve circuit 604 and the decoder circuit 605. The reverse power control circuit 607, the Eb/No monitor circuit 608, and the FER detector circuit 609 are carried in a receiver, and the monitor and control for power controls are performed.

[0055]By the MS common control part 735, the output of each receiver is brought together in the buffer circuit 718. Timing adjustment is performed here and multiplexing of each received data is performed in the multiplexing circuit 719. Since interleave of the multiplexed data is carried out in the interleave circuit 628 of BSC, it performs operation of returning permutation in the DEINTA reeve circuit 720 of the MS common control part 735. Error correction operation is performed by the after decoder circuit 721. The original data is extracted in the rear frame decomposition circuit 722, and the output data 723 is transmitted to the data processing part of a terminal equipment. In this process, decoder-circuit 721 output detects FER of all the

forward links in a forward link FER monitor circuit. This FER information is transmitted to BSC via BS by a reverse link.

[0056]The synthetic example of the frame in the case of receiving by MS is explained. It gets over independently with MS receiver, and each circuit from BS serves as the subframe 718A. Quality (QI) is checked while ID and an attribute are read here. An order which multiplexes the signal received by two or more circuits according to the arrangement of ID is read. With an attribute, control signals change a priority and processing is performed. Only the information series of the subframe 718A is taken out and multiplexes. Since interleave and FEC are still performed, the information 719A after multiplexing cannot be taken out. The permutation of the signal by which interleave was carried out between circuits is returned first in the DEINTA reeve circuit 720. Then, the error correction of the signal FEC(ed) in the decoder circuit is carried out, and the frame 721A is reproduced. It is a signal which 722A should receive except for overheads, such as ID.

[0057]Next, a reverse link is explained. The frame generating circuit 730 of MS105 divides the input data from data terminal apparatus per frame. This frame is error-correcting-code-ized in the coding circuit 729, and the permutation of information is changed in the interleaver circuit 728. MS radio-resources Management Department 732 gives the encoding parameter and interleave parameter at this time. Then, a buffer / full speed control circuit 727 determines the total access speed of the information which should be transmitted to two or more BS. This control is set up by the reverse link-transmission-speed control circuit 724 based on Eb/No or FER of each reverse link as well as the frame error rate of all the reverse links transmitted by the forward link. The operating condition (example: the frequency of a connectable circuit, numerals, time slot) of the radio resources of all the BS to which MS can connect this control must be taken into consideration. Then, a signal can distribute to BS correspondence in the distribution circuit 726. A transmitter is assigned to each BS correspondence at the couple 1.

[0058]Frame-ization is performed in the frame generating circuit 717 so that the wireless interface between MS and BS may be suited with the transmitter of MS. Each transmitter of MS modulates respectively the signal separated for every BS individually, and transmits. In the example of drawing 7, error-correcting-code-ize in the coding circuit 716, and permutation is changed in the interleave circuit 715. Power-controls information is added to the data in the reverse link power-controls bit-interleaved-multiplexing circuit 714. Quadrature modulation is performed in the rectangular diffusion circuit 713, and after the abnormal conditions by the

transmission power gain control in the gain control circuit 712, and the complex diffusion circuit 711, it is changed into a transmit frequency signal in the high frequency circuit 710, and is transmitted to BS.

[0059]Next, BS, reverse link receiving component, and function of BSC are explained. Two or more receivers 533-1 - 533-n are carried in BS so that two or more circuits can be received simultaneously. Each receiver operates independently respectively. The complex back diffusion circuit 502 performs complex back-diffusion of gas in order to take MS sending signal and a synchronization for the signal which the received high frequency circuit 501 received. Then, the rectangular back diffusion circuit 503 performs rectangular back-diffusion of gas for the information after complex back-diffusion of gas, and identifies a channel. The DEINTA reeve circuit 504 and the decoder circuit 505 carry out an error correction to the information after rectangular back-diffusion of gas. The forward power control circuit 507, the Eb/No monitor circuit 508, and the FER detector circuit 509 are carried in a receiver, and the monitor and control for power controls are performed.

[0060]In BSC, the output of each BS receiver is brought together in the reverse FER detector circuit + buffer circuit 401. The reverse FER detector circuit + buffer circuit 401 adjusts the timing of received data. The multiplexing circuit 402 multiplexes each received data. Interleave of the multiplexed data is carried out in the interleave circuit 728 of the MS common control part 735. Then, the DEINTA reeve circuit 403 of BSC performs operation of returning permutation. The after decoder circuit 404 carries out an error correction. The rear frame decomposition circuit 622 extracts the original data, and transmits the output data to NW. The reverse link FER monitor circuit 409 detects FER of all the reverse links based on the output of the decoder circuit 404. This FER information is transmitted to MS105 via BS in a forward link.

[0061]In above-mentioned explanation, as for the transmitter-receiver of BS and MS, the high frequency circuit is set up separately, and the circuit between MS and two or more BS is described on the assumption that it is set up on different frequency. As long as it is a case where this is applied to TDMA, circuit assignment may be identified by a time slot using the same frequency. Employment with single frequency is possible for the thing in which multiple-line setting out on one frequency is possible like CDMA by performing interference control of a timing request to print out files etc. in advance of transmission and reception.

[0062]3. Control method 3.1 of access speed About a forward link, MS105 obtains a circuit with BS with best Eb/No, when Ec/Io of a pilot signal connects with best BS. However, if it exceeds the lower limit from which Eb/No required to maintain the

access speed and line quality of the pilot signal which other BS transmits which need Ec/Io for system management is obtained, the circuit can also communicate by choosing access speed appropriately and making it correspond. Since CDMA is assumed to the present explanation at this time, when MS receives simultaneously from two or more BS, it has a possibility that may be interfering and access speed may fall, but access speed can be raised by using a circuit (slot) reserving system, for example. However, in order to also take into consideration application at an another side ceremony, such as TDMA, and to go ahead with the talk simply, between each circuit of MS and two or more BS, interference is suppressed to such an extent that there is no trouble in system management by frequency or time sharing, and it is assumed here that it is that from which a signal is separated enough.

[0063]The cross connection method is shown below.

[0064](1) MS monitors two or more pilot signals, and sets up the priority which should be connected by Ec/Io.

[0065](2) MS makes connection by an access channel to BS1 to connect.

[0066](3) If connection is completed, MS will report the pilot signal which can connect with BSC106, and its Ec/Io with a data receiving demand via connected BS101. MS105 combines and notifies information, including the classification (example: classification of a control line) etc. of the frequency which can be supported, a numerals channel, the access speed which can be transmitted and received, and the circuit which can be supported. BSC106 identifies BS by ID of a pilot signal. BS102,103 assumes that connection is still more possible.

[0067](4) Check whether the radio resources of BS102,103 can assign BSC to MS105 by knowing that ID of a pilot signal to BS102,103 can be connected.

[0068](5) The circuit (the frequency, numerals, timing), access speed which will be assigned with ID (pilot signal) of BS102,103 if possible It notifies by the BS101 course connected to MS105 now. When impossible, it goes into a waiting state, and the process of (3)--(4) is repeated. It times out by a case.

[0069](6) MS105 sets up reception of the circuit specified about BS102,103.

[0070](7) MS105 starts reception by the circuit as which BS101,102,103 was specified.

[0071](8) BSC106 codes by choosing the parameter of error--correcting--code--izing or interleave according to access speed, distributes a signal for every BS, and starts transmission.

[0072](9) MS105 supervises receiving quality at any time. Monitor parameters are each Eb/No of BS101,102,103, FER, and FER after multiplex. These values are the time intervals defined beforehand, and are reported to BSC using a control channel for

exclusive use. Ec/Io is monitored, and also when BS in which new connection is possible appears, it reports to BSC.

[0073](10) BSC106 adjusts access speed, monitoring (9). Line quality is reported by Eb/No or FER. Access speed is lowered when the channel quality of specific BS deteriorates. Conversely, access speed is gathered when it has improved. The priority of the FER quality after multiplex is made the highest.

[0074](11) When a specific circuit cannot maintain the quality specified even if it lowered access speed to the minimum, make the circuit into ** and continue communication by the remaining circuits.

[0075](12) A hand-off does not carry out. They are only a line connection and **.

[0076]3.2 The cross connection method is shown below about a reverse link.

[0077](1) MS monitors two or more pilot signals, and sets up the priority which should be connected by Ec/Io.

[0078](2) MS makes connection by an access channel to BS101 to connect.

[0079](3) If connection is completed, MS105 will report the pilot signal and Ec/Io of Ec/Io to BSC106 with a data transmission request via connected BS101. BSC106 identifies BS by a pilot.

[0080](4) BSC106 prepares connection of ID of a pilot signal to BS102,103. It is checked whether the radio resources of BS102,103 can assign MS105.

[0081](5) The circuit (the frequency, numerals, transmit timing), access speed which will be assigned with ID (pilot signal) of BS102,103 if possible It notifies to MS105 via BS101 connected now. When impossible, it goes into a waiting state, and the process of (3)-(4) is repeated. It times out by a case.

[0082](6) MS105 sets up transmission by the circuit as which BS102,103 was specified.

[0083](7) MS105 starts transmission by the circuit as which BS101,102,103 was specified.

[0084](8) MS105 codes by choosing the parameter of error-correcting-code-izing or interleave according to the specified access speed, distributes a signal for every BS, and starts transmission.

[0085](9) BSC106 supervises receiving quality at any time. Monitor parameters are Eb/No of the signal received in each of BS101,102,103, FER, and FER after BSC multiplex. These values are the time intervals defined beforehand, and are reported to MS105 using a control channel for exclusive use. MS105 is monitoring Ec/Io, and when BS in which new connection is possible appears, it reports it to BSC106.

[0086](10) MS105 adjusts access speed, monitoring (9). Line quality is reported by

Eb/No or FER. Access speed is lowered when line quality with specific BS deteriorates. Conversely, access speed is gathered when it has improved. The priority of the FER quality after multiplex is made the highest.

[0087](11) When a specific circuit cannot maintain the quality specified even if it lowered access speed to the minimum, make the circuit into ** and continue communication by the remaining circuits.

[0088](12) A hand-off does not carry out. They are only a line connection and **.

[0089]4. The access speed of the setting method circuit unit of access speed can be set up by a desired signal and interference noise power ratio, and shows drawing 8 (a) an example of the correspondence. This correspondence table is stored in the store circuit of a downstream-transmission-speed control circuit (407 or 724). The access speed used as a standard is determined now, and also changes access speed corresponding to change of line quality. Since actual line quality was estimated by FER in many cases, it was also appended to drawing 8 (a). Selection of a line quality parameter (example: FER, Ec/Io, Eb/No) may be changed by the time of a telephone call, etc. at the time of cross connection.

[0090]The access speed after multiplexing is given by total of the access speed of an usable circuit. However, it is necessary to take into consideration interference between this usable circuit at this time. That is, since interference is mutually produced between circuits when using the same frequency and time slot, a different interference from Eb/No currently guessed at the time of Ec/Io measurement is measured, and line quality may be satisfied by degradation of FER. for this reason --- drawing 8 (b) --- interference --- a margin --- the margin is prepared. Between the channels using the same frequency or time slot, an interference margin is given using this successive diminution coefficient. This correspondence table is stored in the store circuit of a downstream-transmission-speed control circuit (407 or 724).

[0091]The interleave between the circuits by the interleave circuit 412 or 728 needs to set up the interleave size oppress degradation of the burst error by phasing etc. enough, even after dividing information into a circuit. Therefore, this size is adjusted according to the access speed ratio between the number of circuit to separate and a circuit. The example of a table is shown in drawing 8 (c). In order to raise line quality by coding gain, the parameter (example: constraint length, coding rate) of a coding mode may be adjusted. The parameter of interleave and a coding mode is stored in the store circuit of the radio-resources Management Department (407 or 732).

[0092]5. Tail Bit for ID, attribute and quality index (QI) with which the input data 631A divided into the distribution method frame length of the data to transmit identifies a

frame, and FEC is added (630A). After redundancy is added to this frame by FEC, it becomes the interleaved series 628A. The series 628A is divided into two or more series according to the determined above-mentioned access speed. Quality indices, such as an order of a series, ID which gives an address, an attribute which gives a data type, and CRC, are given to each information series, and it becomes a subframe of 626A, and is transmitted to BS from BSC. The determination of the distribution destination which distributes the information series of 627A to BS is controlled so that each line quality of access speed, and BS and MS which is performed as the minimum unit and shows drawing 8 the cycle which checks line quality corresponds.

[0093]When access speed falls [a certain circuit] with change of line quality, data may be in the state waiting for transmitting in the buffer circuit 411. In this case, when other circuits have a margin in access speed to that allowable access speed, data is changed to other circuits, without changing into the state waiting for transmitting.

[0094]Access speed in case the circuit is set as drawing 9 between MS and three BS, and the example of distribution of a signal are shown. In the figure, four data blocks shall be transmitted about the data block which evaluates line quality and which time-interval(tn and time interval of tn-+-1)-hit, and carried out interleave at the time of the maximum transmission rate per circuit. In minimum transmission speed, one data block per time interval shall be transmitted. This access speed is determined by the line quality evaluation parameter shown in drawing 8, such as Ec/Io, Eb/No, and FER. If its attention is paid to CH1, since all have line quality in a record level, as for CH1, access speed will also become the maximum during the time t1-t5. On the other hand, in CH2, between the time t1 - t5, since communication quality has deteriorated in proportion to time, access speed also deteriorates in proportion to it. Between the time t1 - t2, since line quality is the minimum, CH3 can send only one data block. However, since line quality improved in the time t3, it is possible to send three data slots.

[0095]Distribution of the send data after interleave gives priority to and distributes the good thing of line quality, and transmits it previously. This is for being the conditions according to propagation environment and transmitting as many signals as possible after line quality data (Eb/No, Ec/Io, FER) reception, as soon as possible.

[0096](Example 3) MS105 carries out call origination and the example of operation in the case of setting up two or more circuits is explained using drawing 10. If MS call request is judged (1000), MS105 will transmit a call request (1001). In this case, the channel which transmits a call request is used. This is henceforth called an access channel. MS105 performs a call request to BS by which registration is made using the

access channel. However, in two or more BS, this access channel is ability ready for receiving, and this may be used, as long as composition of the access channel input signal from two or more BS is possible in BSC106 like other traffic channels and it is.

[0097]A traffic channel is set up between MS105 and BS101 and it is assumed that communications service was started (1002-1011). The case where there is information which wants capacity for MS105 only by the circuit of BS101 and to upload is assumed. MS105 requires the high-speed transmission service by multi-BS transmission from BS (1040). At this time, MS105 transmits the pilot signal and the list of intensity (example: Ec/Io) statistics of BS of the level beyond a certain threshold which MS105 has received to BSC106 (1022). Based on the received list information, BSC106 looks for BS which may be able to communicate with MS105, and it is investigated whether assignment of radio resources is possible (1023). If BS102 is judged that communication is possible by BSC106 here, BSC106 will apply the activate request of a circuit to MS105 to BS102 (1024-1025). At this time, BSC106 permits the cross connection of BS102 to MS105 by a hand-over activate request via BS101 (1026-1027). A circuit is newly set up by the same method as MS105 and BS102, i.e., the conventional hand-over, and, as for MS105, communication becomes possible via BS101 and BS102 (1028-1030). While distributing and transmitting MS105 to the speed which was adapted for each line quality after it error-correcting-code-izes the information to transmit and carries out interleave if communication is started between MS105, and BS101 and BS102, BSC106 multiplexes the signal received by BS101,102, and DEINTA reeve ** decodes it, and it reproduces a signal series (1031-1032). When the number of BS is three or more, it is also the same as that of the above, but the places where a hand-over message becomes two or more differ.

[0098]In the above, when BS connected previously makes connection **, it is dependent on the input-signal electric power and line quality between MS and BS, but this mentions later. The BS/BSC side carries out call origination, a termination is carried out by MS, and the example in the case of setting up two or more circuits is explained using drawing 11.

[0099]BSC106 will transmit a paging message (Page Message) from BS into which MS105 is registered, if the paging demand of MS105 is received from a network (1100) (1101). By MS receiving and compounding the paging message from two or more BS at this time, as long as a recovery is possible, that method may be used. The communication procedure of MS and BS101 into which it is registered is the same as the conventional method (1102-1112). If communications service is started (1113)

and there is a demand of the high-speed data service using multi-BS from the BSC side (1130), BSC106 will transmit a request message via BS101 (1114). At this time, BSC106 may make two or more BS monitor the signal of this MS105 beforehand, and may transmit BS which can serve as a candidate of connection with the message of the first half. MS105 transmits the pilot signal of the signal power beyond a certain fixed threshold, and its list to BSC by BS1 course to the above-mentioned message (1115). Based on the list information of MS105, BSC106 determines BS which serves as a candidate, and assigns radio resources. The radio channel of BS102 shall be assigned (1116-1118). BS101 transmits the hand-over start up message of BS102 to MS105 (1119). MS105 carries out the setting-out start of the circuit of BS102, with the circuit of BS101 held (1120). MS105 sets up the circuit of BS102 by the same method as the conventional hand-over (1121-1123).

[0100]If a circuit will be set up MS105 simultaneously with BS101,102, BSC106 will error-correcting-code-ize the information which should be transmitted, and will distribute it to each of BS101,102 with the access speed corresponding to line quality after interleave. BS101,102 is transmitted by the coding and cell (sector) signal setting out which are set up independently, respectively. In MS105, after restoring to the signal from BS101,102 as an input-signal series which became independent respectively, it multiplexes, and decodes after a DEINTA reeve and an information series is reproduced (1124-1125). When the number of BS is three or more, it is also the same as that of the above-mentioned, but the places where a hand-over message becomes two or more differ.

[0101](Example 4) The outline of the method of hand-over is explained using drawing 12. The succeedingly detailed example of a sequence is explained using drawing 13. In drawing 12, BS101-104 has each service area and each service area is overlapped selectively as mentioned above. The case where MS105 which is present in the area of BS101 moves to the area of BS104 is considered. In drawing 12 (a), since MS105 is in the field which can obtain service only from BS101, it has not connected the circuit in other BS 102-104. In drawing 12 (b), MS105 is moving to the boundary of the area of BS101 and BS103. MS105 set up both BS and circuits, and has transmitted and received information which is different with the access speed corresponding to Eb/No of each circuit. In drawing 12 (c), MS105 is in the cell area of BS101,103,104 and has set the circuit to these three BS. However, it is outside the cell field of BS102. MS105 can obtain BS103 and best Eb/No and is communicating with high access speed. Since the circuit of BS101 has bad line quality, it has a low speed. Drawing 12 (d) is the example which MS105 moved to the field in which all the BS and connection of

BS101-104 are possible. Also in this case, four circuits have transmitted a different information series with the access speed according to interference conditions.

[0102]Next, concrete operation of hand-over is explained using drawing 13. It is assumed that MS105 is connected to both BS101 and BS102 (1300). MS105 is controlling access speed according to an interfering state, performing two BS and power controls. One shall be provided in a high priority at least among two or more circuits, and the right of priority of transmission and reception shall be granted. This ranking specifies the right of priority of the reservation method of a circuit, the importance of the signal to transmit, etc. Here, it is assumed that a high priority is first given to BS101 and communication is continued (1301, 1302).

[0103]Release of the circuit under connection by hand-over is performed in the same procedure as the hard hand-over which delivers a circuit between the systems by which the conventional frequency differs. However, transmission and reception of a control signal are performed only using the high circuit of a priority.

[0104]If there are some which have the conditions of the high circuit of a priority in others when the signal strength becomes low and is less than a threshold (1303), although the signal from BS101 is in a high priority (1304), a high priority will be changed to BS102 at least one of them, and here. MS reports the candidate list of new BS while notifying change of BS priority to BSC (1305) (1306). The operation in the case of newly connecting BS is almost the same as operation of drawing 10. If Ec/Io from BS101 deteriorates rather than a threshold, while MS105 directs to lower access speed to BS101, the access speed from MS105 is also lowered (1309).

[0105]If Ec/Io deteriorates below in a threshold with difficult maintenance of the circuit of BS101 (1308), MS105 will report the list of new BS to BSC106 (1309), it will report that the circuit of BS101 is released (1310), and communication with BS101 will be ended (1312). BSC106 releases the radio resources of BS101 (1313). The circuit of only BS2 is maintained in this example (1314).

[0106]

[Effect of the Invention]There are the following effects in this invention.

[0107](1) The available wireless resource accompanying BS arrangement is utilizable for the maximum. That is, though MS is in the good radio wave environment which is below in a fixed interference noise electric power threshold from two or more BS, it is already connected with one circuit and it becomes possible to communicate with the access speed according to line quality with other BS to MS which cannot use a circuit with other BS. As a result, improvement in access speed is possible between MS and BSC.

[0108](2) Don't connect the same traffic concurrently to two or more BS like a soft hand over with Takeshi of the circuit accompanying movement of MS at the time of connection. However, since the signal which carried out interleave to FEC is distributed between circuits, even if disappearance of information arises in some circuits, in order to compensate the signal deficit between BS using coding gain, little communication of data deficiency is attained at the time of the circuit change between MS-BS.

[0109](3) Even if the circuit between a certain BS and MS deteriorates temporarily, even if one line quality deteriorates since an error correction and interleave are performed between the circuits which distribute information, the characteristic after a recovery is improvable after other circuits and multiplexing using coding gain.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a figure showing the communications system composition of this invention.

[Drawing 2]It is a figure showing the communications system composition of this invention.

[Drawing 3]It is a figure showing the frame structure of this invention.

[Drawing 4]It is a figure showing the example of composition of the base station control station of this invention.

[Drawing 5]It is a figure showing the example of composition of the base station of this invention.

[Drawing 6]It is a figure showing the example of composition of the terminal of this invention.

[Drawing 7]It is a figure showing the example of composition of the terminal of this invention.

[Drawing 8]It is a figure showing the example of a parameter of this invention.

[Drawing 9]It is a figure showing the related example of line quality and circuit access speed.

[Drawing 10]It is a figure showing the example of a cross connection sequence at the time of MS call origination.

[Drawing 11]It is a figure showing the example of a cross connection sequence at the time of MS termination.

[Drawing 12]It is a figure showing the example of communication at the time of terminal movement.

[Drawing 13]It is a figure showing the example of a control sequence at the time of terminal movement.

[Description of Notations]

101-104 --- BS1-4 (base station 1-4),

105 --- MS (radio terminal),

106 --- BSC (base station controller),

107 --- Network,

301 --- Data collection part (Data Concentration),

302 --- A buffer/multiplex section,

303 --- Decoding part,

304 --- Access speed control section,

305 --- Radio-resources Management Department,

306 --- Distribution part,

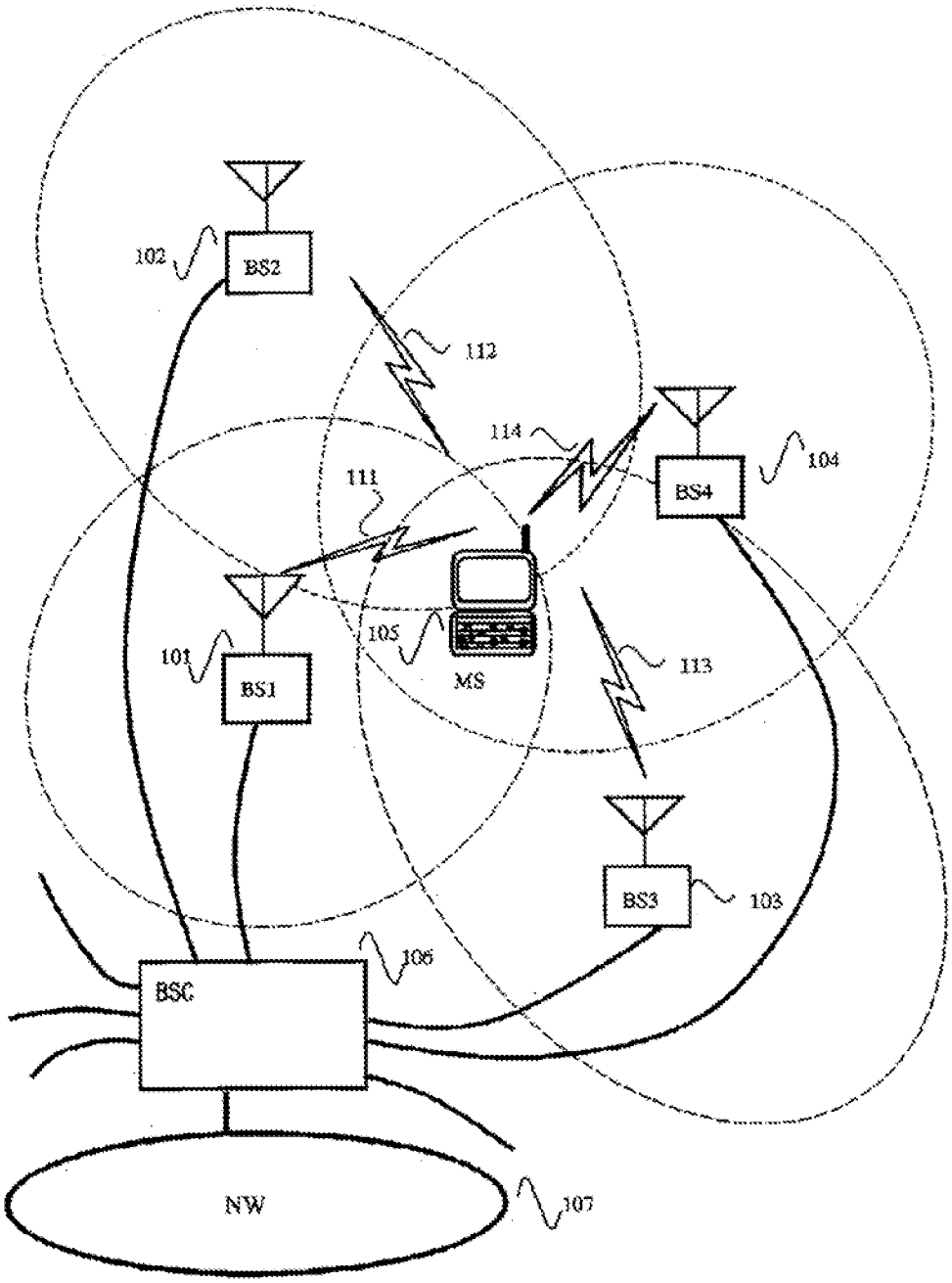
307 --- A buffer/separation part,

308 --- Coding part.

DRAWINGS

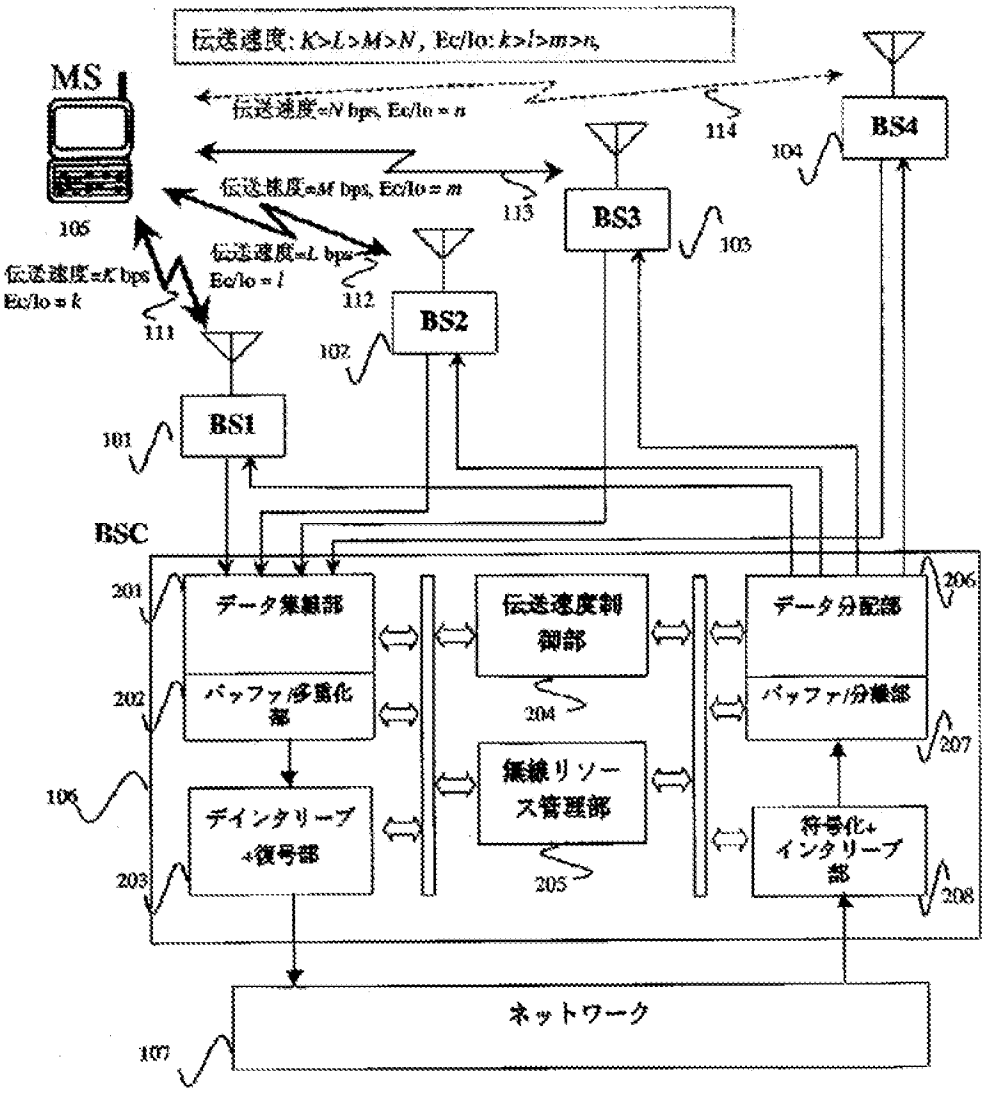
[Drawing 1]

▨ 1



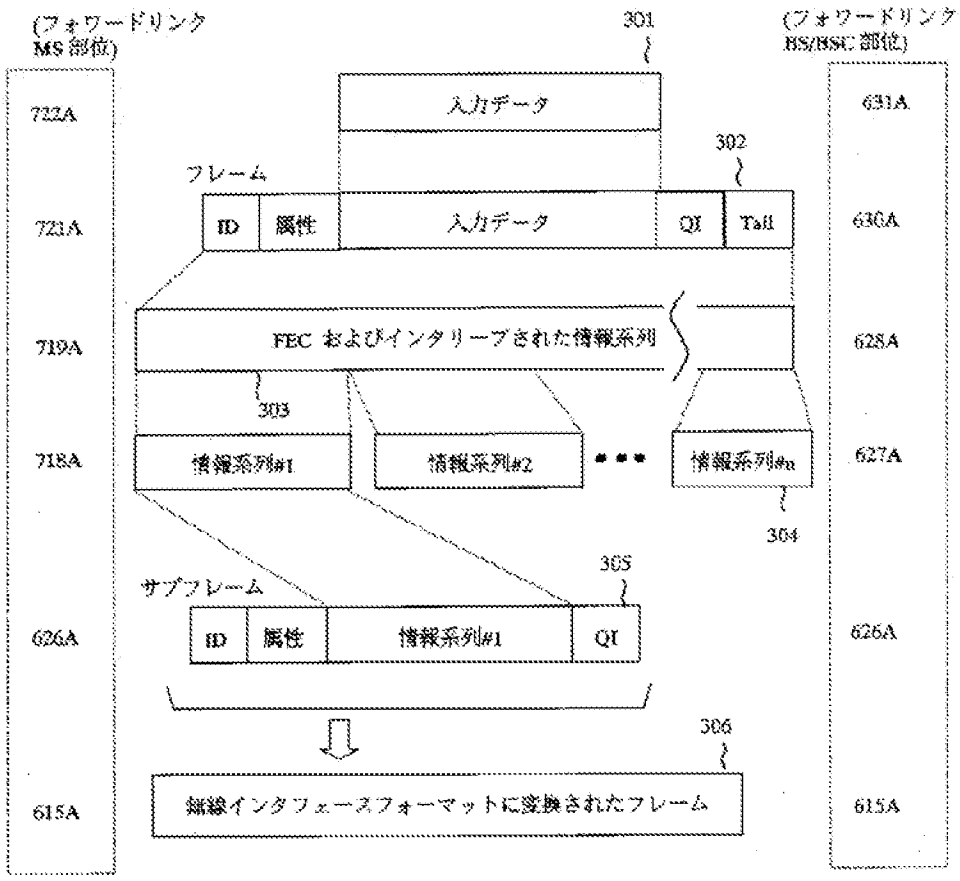
[Drawing 2]

図 2


伝送速度: K>L>M>N, Ec/Io: k>l>m>n,
MS
伝送速度=N bps, Ec/Io = n
114
BS4
104
伝送速度=M bps, Ec/Io = m
113
BS3
103
105
伝送速度=K bps
Ec/Io = k
伝送速度=L bps
Ec/Io = l
112
BS2
111
102
BS1
101
BSC
201
データ集線部
伝送速度制御部
データ分配部
206
202
バッファ/多重化部
204
バッファ/分離部
207
106
デインタリーブ+復号部
集線リソース管理部
符号化+インタリーブ部
203
205
208
ネットワーク
107

[Drawing 3]

図 3

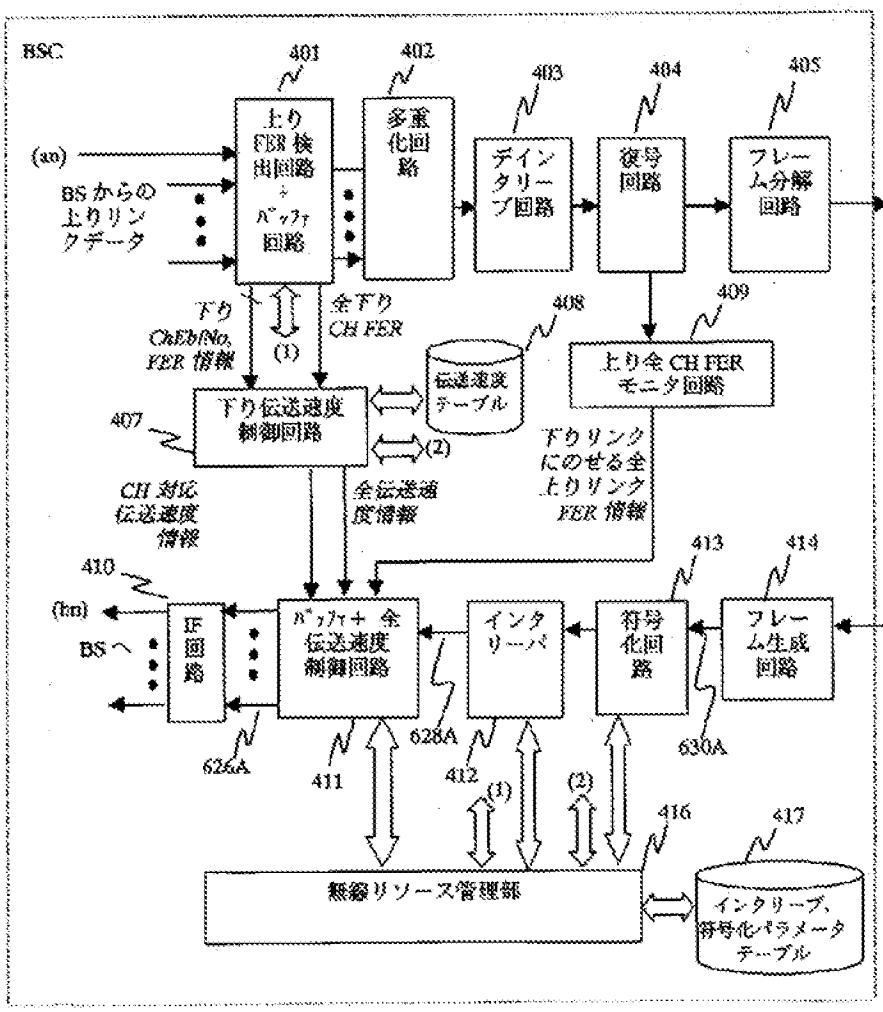


Note:

- QI=品質指標(Quality Information)
- FEC=誤り訂正符号化(Forward Error Correction)
- Tail=FEC 用付加ビット
- ID=識別子(IDentifier)

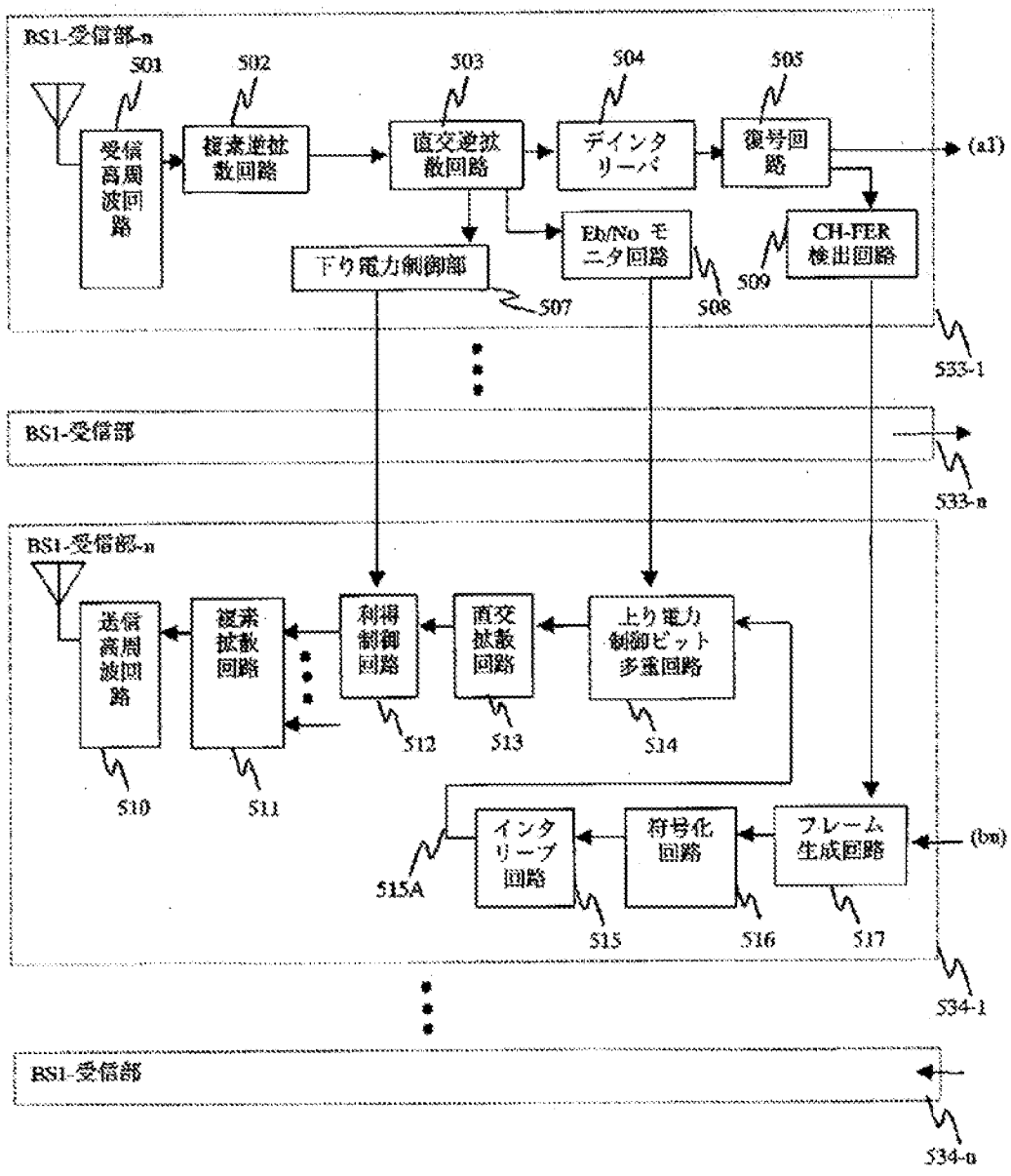
[Drawing 4]

図 4


BSC
401
402
403
404
405
406
上り FER 検出回路 + バッファ 回路
多重化回路
デインタリーブ回路
復号回路
フレーム分解回路
出力データ (NW へ)
(an)
BS からの上りリンクデータ
下り CkEb/No, FER 情報
(1)
全下り CH FER
408
伝送速度テーブル
409
上り全 CH FER モニタ回路
407
下り伝送速度制御回路
(2)
CH 対応伝送速度情報
全伝送速度情報
下りリンクにのせる全上りリンク FER 情報
415
人力データ (NW から)
413
414
410
(bn)
BS へ
IF 回路
バッファ + 全伝送速度制御回路
インタリーバ
符号化回路
フレーム生成回路
626A
411
628A
412
630A
(1)
(2)
416
417
無線リソース管理部
インタリーブ、符号化パラメータテーブル

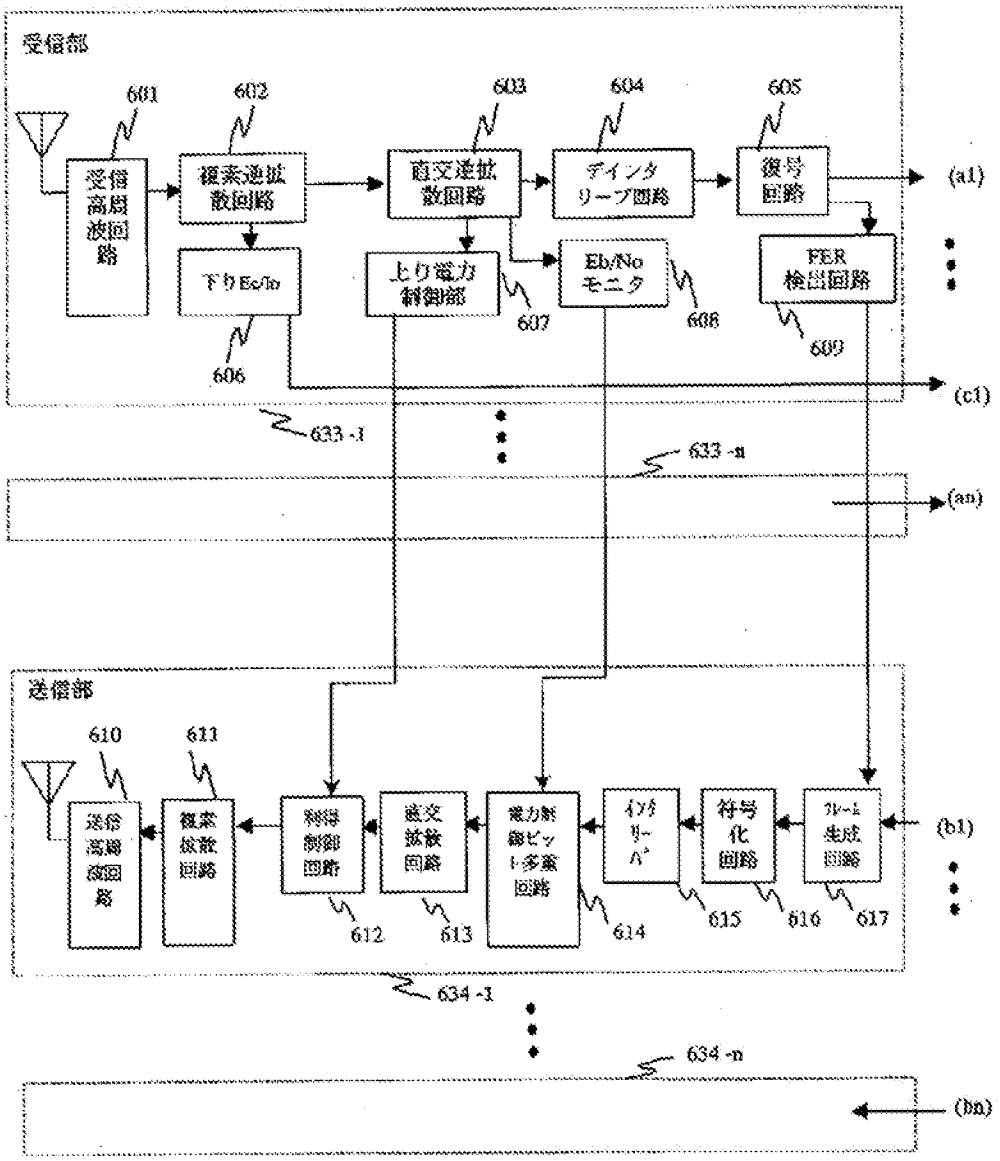
[Drawing 5]

図 5


BS1-受信部-n
501
502
503
504
505
受信高周波回路
複素逆拡散回路
直交逆拡散回路
デインタリーバ
復号回路
(a1)
下り電力制御部
Eb/No モニタ回路
CH-FER 検出回路
507
508
509
533-1
BS1-受信部
533-n
BS1-受信部-n
送信高周波回路
複素拡散回路
利得制御回路
直交拡散回路
上り電力制御ビット多重回路
510
511
512
513
514
(bn)
フレーム生成回路
符号化回路
インタリーブ回路
515A
515
516
517
534-1
BS1-受信部
534-n

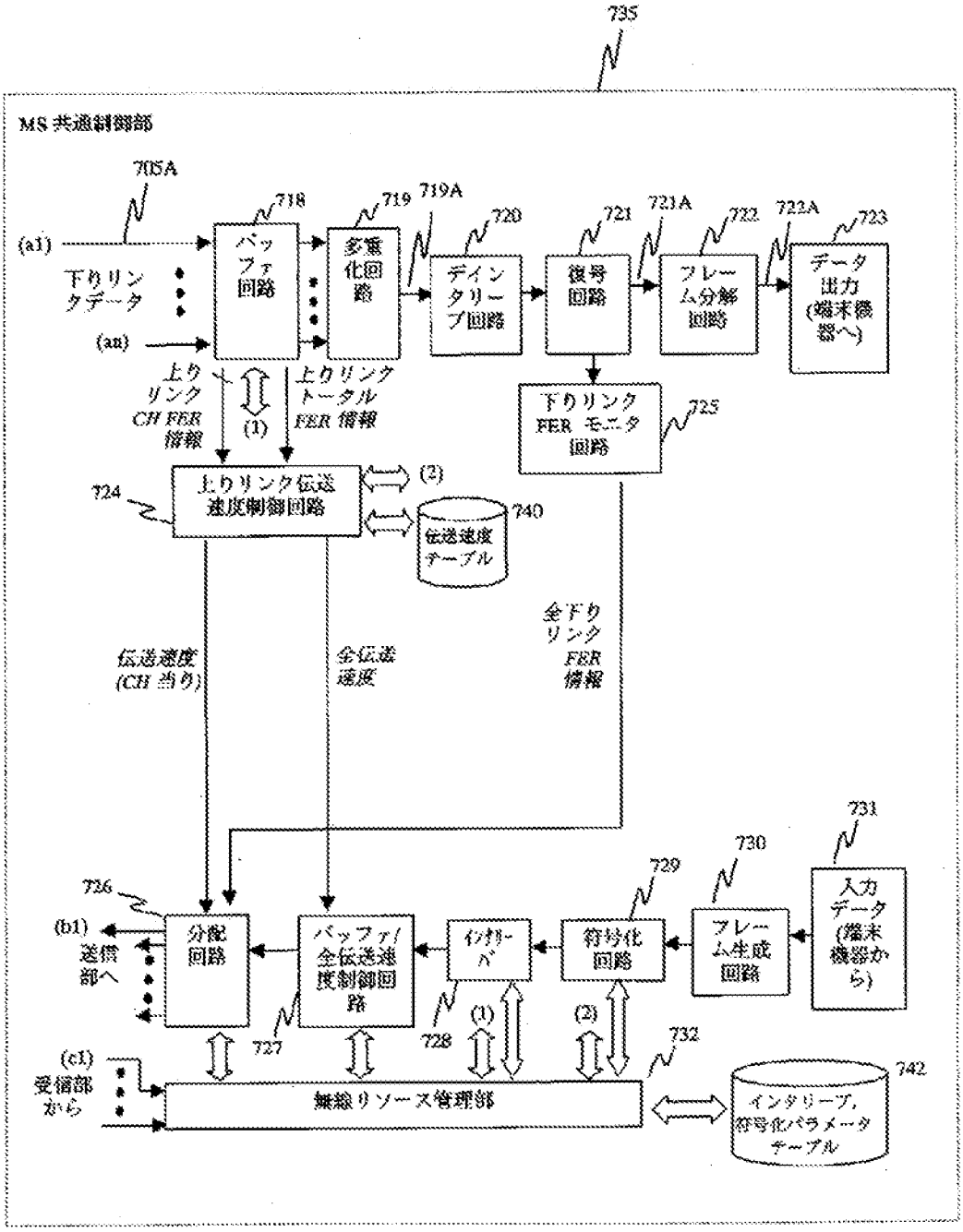
[Drawing 6]

図 6


受信部
601
602
603
604
605
受信高周波回路
複素逆拡散回路
直交逆拡散回路
デインタリーブ回路
復号回路
(a1)
下りEc/Io
上り電力制御部
Eb/Noモニタ
FER検出回路
606
607
608
609
(c1)
633 -1
633 -n
(an)
送信部
610
611
送信高周波回路
複素拡散回路
制御回路
直交拡散回路
電力制御ビット多重回路
インタリーバ
符号化回路
フレーム生成回路
(b1)
612
613
614
615
616
617
634 -1
634 -n
(bn)

[Drawing 7]

図 7


735
MS 共通制御部
705A
(a1)
下りリンクデータ
(an)
718
バッファ回路
719
多重化回路
719A
720
デインタリーブ回路
721
復号回路
721A
722
フレーム分解回路
722A
723
データ出力(端末機器へ)
上りリンク CH FER 情報
(1)
上クリンクトータル FER 情報
下りリンク FER モニタ回路
725
724
上りリンク伝送速度制御回路
(2)
740
伝送速度テーブル
伝送速度(CH 当り)
全伝送速度
全下りリンク FER 情報
731
730
729
736
(b1)
送信部へ
分配回路
バッファ/全伝送速度制御回路
インターバ
符号化回路
フレーム生成回路
入力データ(端末機器から)
727
728
(1)
(2)
732
(c1)
受信部から
無線リソース管理部
742
インタリーブ,符号化パラメータテーブル

[Drawing 8]

図8

(a)回線単位の伝送速度パラメータ

最低Ec/Io	*s*	*t*	----	*v*	*w*
最低Eb/No	*k*	*l*	----	*m*	*n*
CH当りの許容最大伝送速度	*K*	*L*	----	*M*	*N*
回線ごとのFER	各回線の品質の評価に使用する。たとえばFERが基準値を下回る場合には伝送速度を下げる。				

(b)多重化後の全伝送速度パラメータ

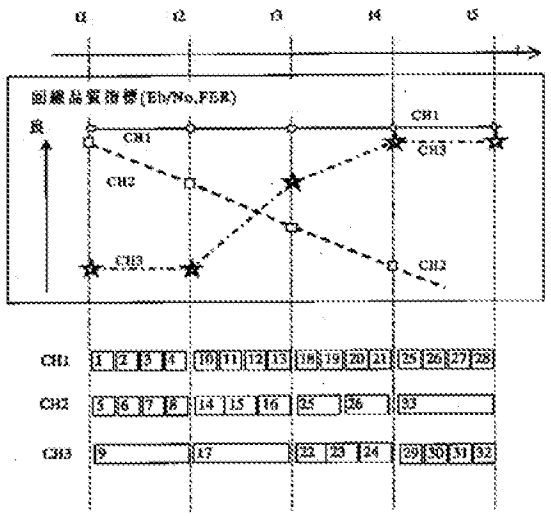
回線ごとの推定伝送速度総和	*a*	*b*		*c*	*d*
干渉余裕係数	同一の周波数やタイムスロットを回線間で許容する場合に、特定の回線に適用する。回線予約方式やシステムの干渉余裕度に依存する。				
許容最大伝送速度(多重化後)	*W*	*X*	----	*Y*	*Z*
多重化後のFER	各回線を多重化した後の品質の評価に使用する。たとえばFERが基準値を下回る場合には伝送速度を下げる。				

(c)多重化信号のインタリーブサイズパラメータ

接続回線数	*a*	*b*		*c*	*d*
回線間の伝送速度比	*p*	*q*		*r*	*s*
インタリーブサイズ(インタリーブするフレーム数)	*s*	*t*	----	*v*	*w*

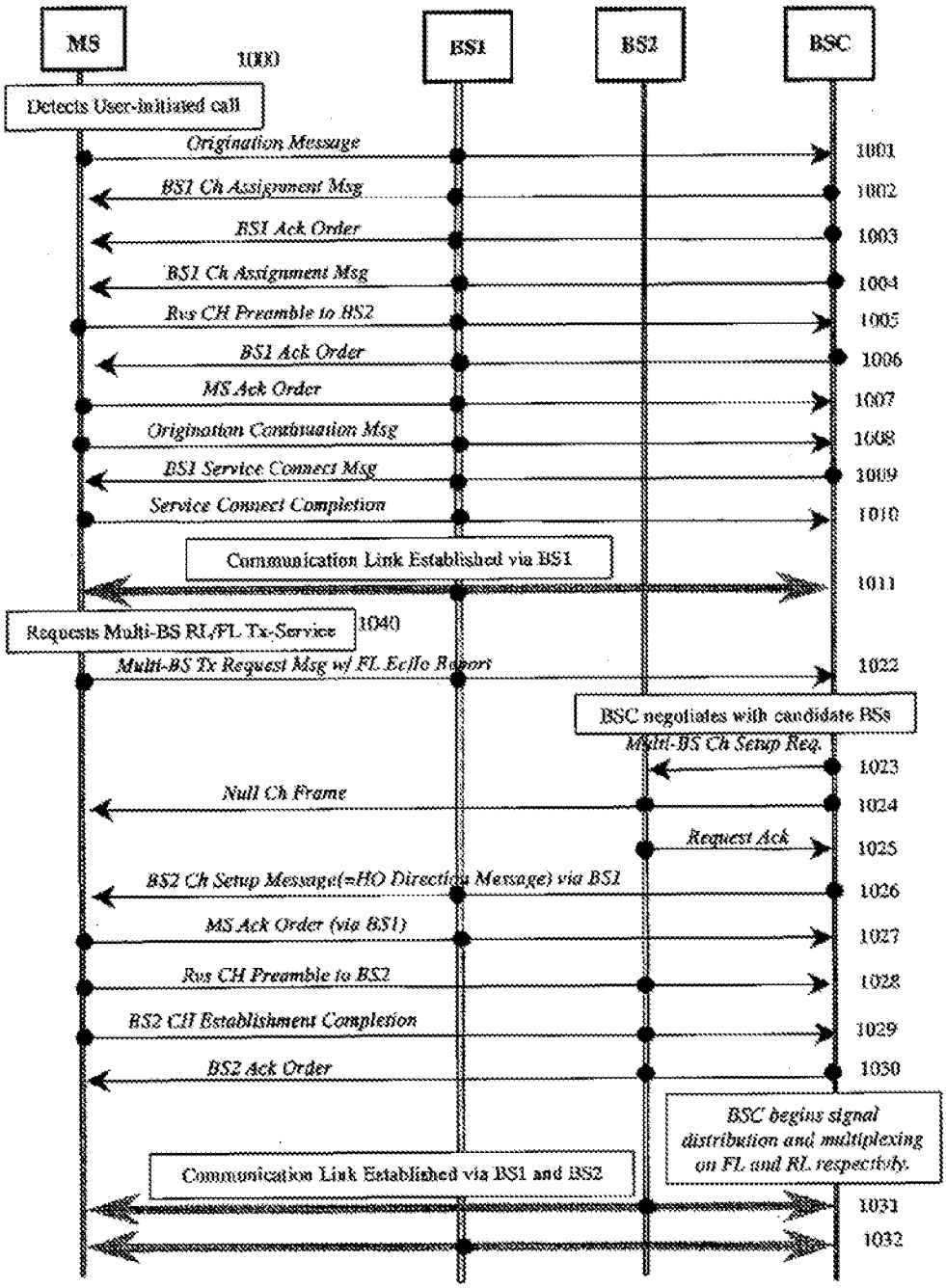
[Drawing 9]

図9


t1
t2
t3
t4
t5
t
回線品質情報(Eb/No,FER)
質
CH1
CH2
CH3
CH1
CH2
CH3
CH1
1 2 3 4 10 11 12 13 18 19 20 21 25 26 27 28
CH2
5 6 7 8 14 15 16 25 26 33
CH3
9 17 22 23 24 29 30 31 32

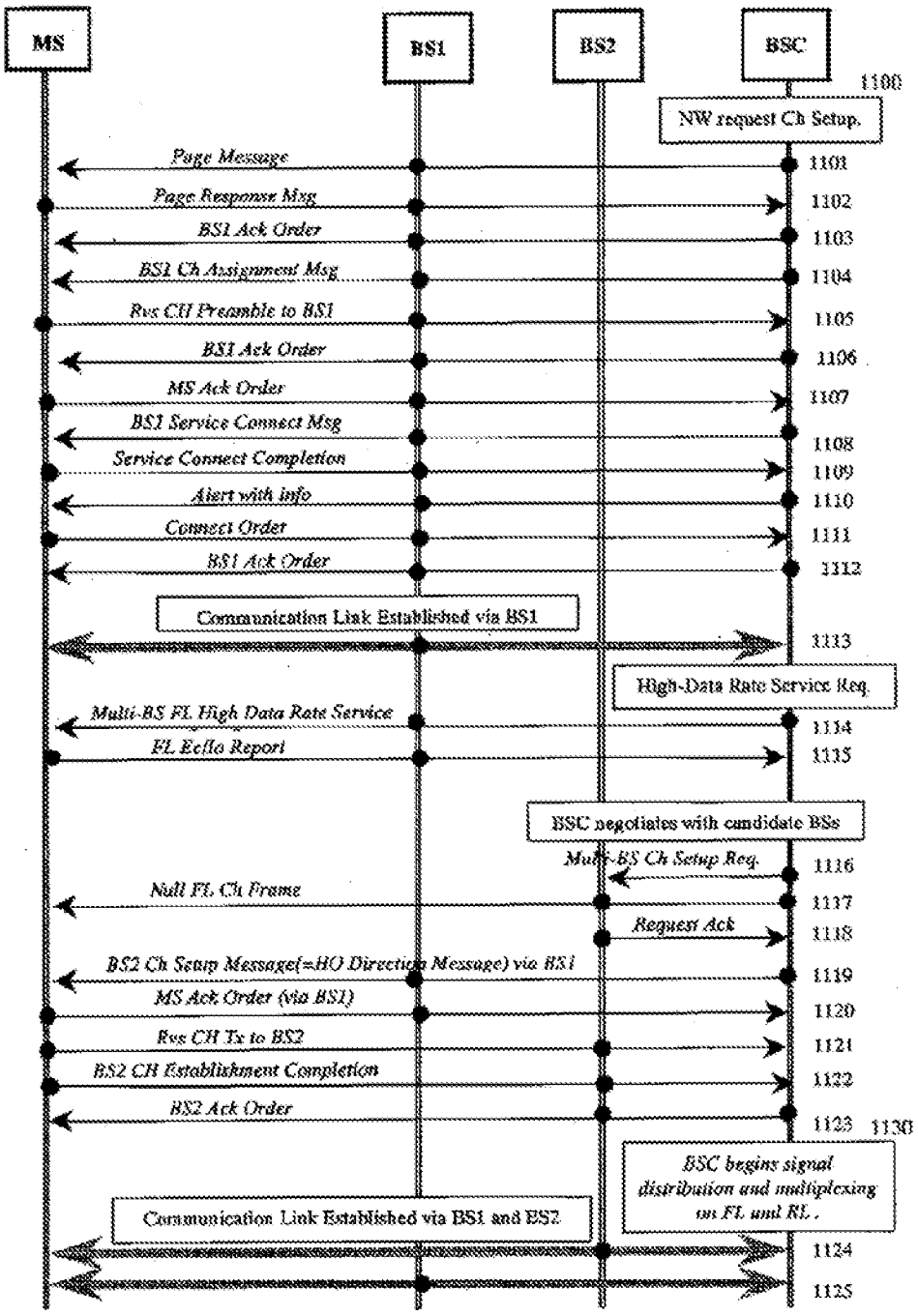
[Drawing 10]

図 10



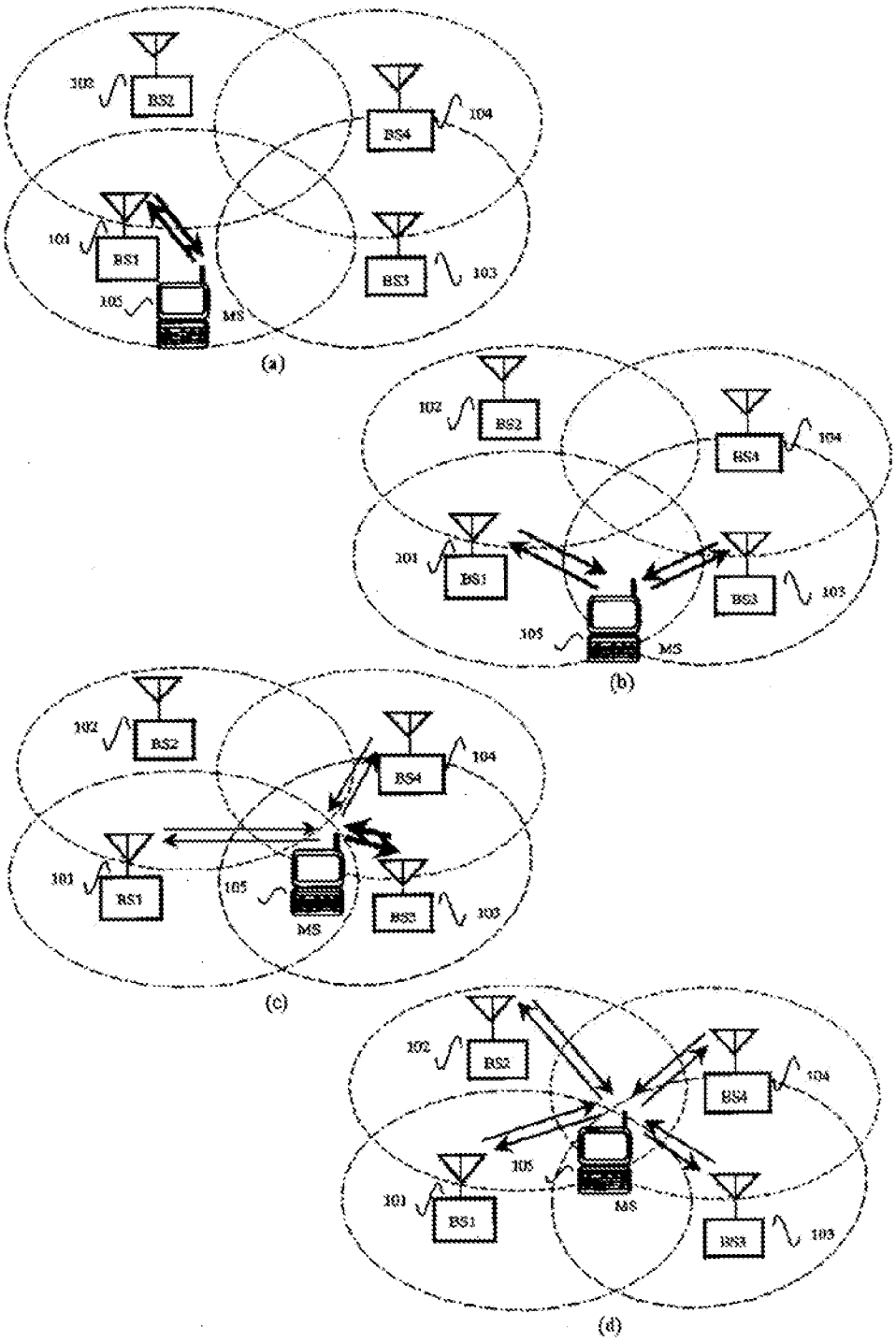
[Drawing 11]

☒ 11



[Drawing 12]

図 12



[Drawing 13]

図 1 3